Claim 12 has been amended for clarity and has been rendered in a form that should be recognized as a product-by-process claim. Such claim formats are expressly provided for in MPEP 2173.05(p).

Rejection of claims 1-7, 9, and 11-24 Under 35 USC 102

Claims 1-7, 9 and 11-24 stand rejected under 35 USC 102 as being anticipated by PCT publication WO 9742462 of Martinez-Tovar (hereinafter referred to as "the Martinez-Tovar PCT application").

The Martinez-Tovar PCT application discloses a semiconductor bridge device comprising a bridge formation of semiconductor material on a substrate. The bridge is covered by a layer of metal including titanium and tungsten, with titanium in contact with the semiconductor bridge material and the tungsten on top of the titanium. In formulating the rejection, the Examiner states that the rejected claims call for a layer of titanium on the semiconductor bridge and that the Martinez-Tovar PCT application describes a layer of titanium on the semiconductor bridge.

As discussed with the Examiner via telephone on January 22, 2002, the office action has failed to address the fact that in the paper filed July 6, 2001 in the captioned application, claim 1 was amended to state that the layer on top of the semiconductor bridge material "consists essentially of" titanium. As was explained in that paper, this limitation provides a novel and non-obvious distinction relative to the Martinez-Tovar PCT application because the term "consisting essentially of" is intended to indicate the substantial exclusion of tungsten from the metal layer. This exclusion gives the claimed semiconductor bridge device significantly different properties from that shown by the Martinez-Tovar PCT application. Since the Martinez-Tovar PCT application only shows a device having both titanium and tungsten on the bridge, and since it provides no suggestion for omitting the tungsten, this reference cannot properly be said to anticipate claim 1 as it now stands. Claim 18 contains a similar limitation relative to the layer on the semiconductor bridge material. Accordingly, claims 1, 18 and claims 2-11, 15-18, 19 and 20 dependent therefrom are patentably distinguishable from the Martinez-Tovar PCT application.

Independent claim 12 and claims 13, 14 and 17 dependent therefrom, provide a separate patentable distinction relative to the Martinez-Tovar PCT application by describing a semiconductor bridge igniter made by a particular process, the process involving depositing an exposed layer of titanium on the semiconductor bridge material and preconditioning the igniter.

As described in the application at page 5, lines 1-17, an exposed layer of titanium on a semiconductor device that has not been preconditioned is subject to post-manufacturing variations in resistivity. No exposed layer of titanium and no such changes in resistivity in such a layer were disclosed or suggested in the Martinez-Tovar PCT application, and no preconditioning step as recited in claim 12 was disclosed or suggested therein. Accordingly, claims 12 and 13, 14, 17, 19 and 20 dependent therefrom all contain a patentable distinction relative to the Martinez-Tovar PCT application.

Independent claim 21 defines a method of operation of a semiconductor bridge igniter, the method including applying a voltage sufficient to melt the metal and vaporize the semiconductor material thereunder. No such method of operation is taught or suggested by the cited reference. As described in the subject application at page 3, lines 18-31, the tungsten used in the metal layer of the semiconductor bridge device shown in the Martinez-Tovar PCT application is not melted by the voltage that causes the vaporization of the silicon thereunder, and the solid metallic tungsten inhibits the transfer of energy from the plasma created by the semiconductor bridge to the energetic material it is supposed to ignite. This clearly indicates that the method of operation of the device shown in that reference does not achieve the step defined in claim 21, i.e., the voltage applied to the bridge does not lead to the melting of the metal thereon. Furthermore, there is no suggestion in the reference towards operating the igniter device in this way and, given the inherent difference in the melting temperature of tungsten (about 3410°C), and the vaporization temperature of the bridge material (about 1412°C), the semiconductor bridge material will vaporize before the tungsten could melt, so it does not appear to be possible for the device shown by the Martinez-Tovar PCT application to operate according to the claimed method.

Claim 22 further defines a method of operation of the Applicants' invention in which the specific properties of the semiconductor bridge material and the metal layer thereon such that the application of current generates temperatures that produce particular relationships between the resistance of the semiconductor material and the metal thereon. As no such relationships appear to be achieved in the Martinez-Tovar PCT application device, claim 22 defines a further patentable distinction relative to the cited reference.

For the reasons discussed above, each of the independent claims pending in the application defines a patentable distinction relative to the cited reference. Accordingly, the stated ground of rejection is respectfully traversed.

Rejection of Claims 8 and 9 Under 35 USC 103

Claims 8 and 9 stand rejected under 35 USC 103 as being obvious in view of the Martinez-Tovar PCT application and U.S. Patent 4,976,200 ("Benson et al").

Claims 8 and 9 further define the semiconductor material of the semiconductor bridge igniter defined in claim 1.

Benson et al discloses a tungsten bridge igniter device and provides no teaching or suggestion for the substitution of tungsten by titanium, as taught by the present application and defined in claim 1. Accordingly, claims 8 and 9 depend from a base claim that is not only allowable over the Martinez-Tovar PCT application for reasons set forth above, but which is also non-obvious even in view of the combination of references applied against claims 8 and 9. Therefore, these claims are allowable at least because they depend from an allowable base claim.

Double-Patenting Rejection

Claims 1-7, 9, and 11-24 of the captioned application stand rejected under the judicially created doctrine of obviousness-type double patenting over claims 1, 3, 4, 5-9, 12-20 and 36 of U.S. Patent 6,133,146 to Martinez-Tovar et al (hereinafter referred to as "the Martinez-Tovar et al patent"). Claims 1-24 of the captioned application stand rejected on the basis of obviousness-type double patenting over those same claims of the Martinez-Tovar et al patent, in view of Benson et al.

Each of claims 1-20 and 36 of the Martinez-Tovar et al patent defines a semiconductor bridge igniter device in which the layer of metal on the semiconductor bridge material comprises tungsten. It should be noted that the application on which the Martinez-Tovar et al patent was granted is the same as that on which the Martinez-Tovar PCT application is based, and their disclosures are substantially the same. Accordingly, for reasons set forth above, the claims of the pending application are all patentably distinct from the cited claims of the Martinez-Tovar et al patent because there is no teaching or suggestion in the patent for the exclusion of tungsten from the metal layer on the bridge, as required by claims 1 and 18 of this application. Furthermore, there is no teaching or suggestion towards the manufacture of an igniter device according to the process recited in claim 12, or for the method of operation of such a device as defined in claims 21-24. For these reasons, the double-patenting rejection is respectfully traversed.

Each of the stated grounds of rejection has been addressed or traversed. Reexamination and reconsideration of the application is respectfully requested.

Respectfully submitted,

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Atty Docket: P-1583

Group Art Unit: 3641

January 25, 2002

COPY OF THE SPECIFICATION SHOWING AMENDMENTS

(Added material is underlined and deleted material is shown in brackets.)

Page 2, lines 6-14

In accordance with the present invention there is provided a titanium semiconductor bridge device comprising a substrate and an electrical bridge structure disposed on the substrate [and electrically insulated therefrom]. The bridge structure comprises a layer of a material having a negative coefficient of electrical conductivity at temperatures above ambient temperature and having disposed thereover a layer consisting essentially of titanium, the bridge structure comprising a bridge section extending between and connecting spaced-apart pad sections, each pad section being of larger area than the bridge section. A pair of electrically conductive lands each overlies a respective one of the pad sections and is spaced apart from the other land to leave the bridge section exposed.

Page 2, line 31 through page 3, line 3

In a method aspect of the present invention, there is provided a method for making [the] a titanium semiconductor bridge igniter, which method includes depositing a layer of semiconductor material and an exposed layer of titanium thereon onto a substrate in a bridge formation, forming electrical contact pads at opposite ends of the bridge formation, and preconditioning the titanium semiconductor bridge igniter by heating it to an elevated temperature to stabilize it against temperature-induced variations in bridge electrical resistance, for example, a method in which the igniter is heated to an elevated temperature of from about 37°C to about 250°C, e.g., from about 100°C to 250°C.

Libert & Associates

Atty Docket: P-1583

Group Art Unit: 3641

January 25, 2002

COPY OF THE CLAIMS SHOWING AMENDMENTS

(Added material is underlined and deleted material is shown in brackets.)

1. (Twice amended) A semiconductor bridge igniter comprising:

a substrate;

an electrical bridge structure disposed on the substrate [and electrically insulated therefrom], the bridge structure comprising a layer of a semiconductor material having a negative coefficient of electrical conductivity at temperatures above ambient temperature and having disposed thereover a layer consisting essentially of titanium, the bridge structure comprising a bridge section extending between and connecting spaced-apart pad sections, each pad section being of larger area than the bridge section; and

a pair of electrically conductive lands each overlying a respective one of the pad sections and being spaced apart from each other to leave the bridge section exposed.

12. (Twice amended) A semiconductor bridge igniter comprising:

a substrate;

an electrical bridge structure disposed on the substrate and electrically insulated therefrom, the bridge structure comprising a layer of a semiconductor material having a negative coefficient of electrical conductivity at temperatures above ambient temperature and having disposed thereover a layer of titanium, the bridge structure comprising a bridge section extending between and connecting spaced-apart pad sections, each pad section being of larger area than the bridge section; and

a pair of electrically conductive lands each overlying a respective one of the pad sections and being spaced apart from each other to leave the bridge section exposed, made by [a] the method [which includes] comprising depositing a layer of semiconductor material and an exposed layer of titanium thereon on a substrate in a bridge formation, forming contact pads at opposite ends of the bridge formation, and preconditioning the titanium semiconductor bridge igniter by heating it to an elevated temperature to stabilize it against temperature-induced variation in bridge electrical resistance.